(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 282 465**
**A2**

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: **88830094.4**

(22) Date of filing: **09.03.88**

(51) Int. Cl.[4]: **D 06 F 39/12**
D 06 F 37/26

(30) Priority: **10.03.87 IT 1963787**

(43) Date of publication of application:
**14.09.88 Bulletin 88/37**

(84) Designated Contracting States: **DE ES FR GB SE**

(71) Applicant: **SMEG S.p.A.**
**Via Circonvallazione Nord, 36**
**Guastalla (Reggio Emilia) (IT)**

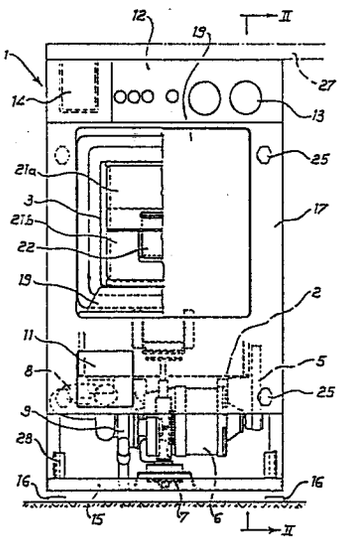
(72) Inventor: **Verona, Valter**
**Via Cappuccini, 16**
**Gustalla Reggio Emilia (IT)**

(74) Representative: **Adorno, Silvano et al**
**c/o SOCIETA' ITALIANA BREVETTI S.p.A. Via Carducci, 8**
**I-20123 Milano (IT)**

(54) **Washing-machine of reduced size with unchanged load capacity.**

(57) A washing-machine of reduced size, particularly such as to have an overall width of 40-45 cm while maintaining a load capacity of at least 5 Kg like the commonly known washing-machines being 60 cm wide, has its loading door on one of the two narrow vertical sides. In association therewith the inlet openings to the washing tank and drum are formed at the peripheral skirt of the respective cylindrical containers, as the access to the drum can be closed in a known manner, such as by a snap door. This construction is obtained by providing the drum with a rotating shaft which is mounted at both ends on bearings connected to the tank side walls, so as to be parallel to the front, accessible portion of the machine. Therefore the washing-machine, by means of few arrangements and negligible modifications of the moulds, may be provided either of the front or of the top-loading type, as a "free-standing" model or of the built-in type.

Fig.1




EP 0 282 465 A2

**Description**

"WASHING-MACHINE OF REDUCED SIZE WITH UNCHANGED LOAD CAPACITY"

The present invention relates to a washing-machine of reduced size, especially in width, with an unchanged load capacity in comparison with the conventional machines.

It is known that at present the electric household appliances industry is oriented to manufacture apparatuses of reduced size or at any rate, among the products in the range of traditional dimensions, apparatuses with reduced size are also appearing. The reasons of this trend are clear, i.e. first of all the available room being more and more restricted in the new houses or however the need of exploitation of the space available for a more practical utilization.

On the other hand it is also known that with a size reduction a proportional reduction of the performances is experienced nearly always, especially when considering the load capacity of dishwashers and washing-machines.

Referring more specifically to the washing-machines, some of these have been produced recently which, in spite of having a width limited to only 40-45 cm., show however washing performances and a load capacity totally corresponding to the traditional values, as they can efficiently wash at least 5 Kg. of dry laundry, like the machines on sale, having a standard width of 60 cm. However the washing-machines of this type, with reduced dimensions and unchanged load capacity, are exclusively provided to be loaded from the top. It is true that sometimes washing-machines of the top-loading type are convenient, but it should be appreciated that these machines cannot be provided for a built-in construction, i.e. are unsuitable to be recessed in a forniture system having an uninterrupted top plane, just due to the fact of being chargeable only from above.

Therefore it is the object of the present invention to provide a washing-machine with the advantages of a reduced overall width, even when a front side loading is foreseen.

A further object of the invention is that of providing a washing-machine the main components of which may be used both for a front side and a top loading type by means of the same moulds, by adopting only simple modifications from one type to the other. Furthermore the machine of the invention can be manufactured either as free-standing household appliance or as a built-in model by merely providing in this latter case, with reference to the front side loading machine, the equipments required for the possibility of being integrated in a continuous, modular assembly.

These objects and advantages are obtained with a washing-machine having a cylindrical washing tank and a rotary drum mounted on a shaft for rotating co-axially within said tank as it is moved by a driving motor through a pulley that is co-axial with the said drum, characterized by the rotation axis of the drum extending itself between two end bearings mounted to the side walls of the tank and being parallel to the front vertical wall of the machine, the inlet door to the machine inside being provided on said wall or on the top for a possible loading from above, there being also provided an associate opening, formed at the peripheral skirt of the tank, as well as an opening suitable to be closed at the periphery of the rotary drum.

The washing-machine of the invention will have therefore a maximum overall width which can be of 40-45 cm, with tank and drum of standard dimensions and, according to a preferred embodiment, the front loading door is hinged along its lower side, with a retainer being provided to stop the same when open at a horizontal position.

According to another preferred embodiment, the machine of the invention has the filter sloping upwardly so as to have its outlet at a front wall position without interference with the lower band which, in "built-in" embodiments, comprises a baseboard to be adjusted in the depth direction.

A first great advantage is apparent from the foregoing, deriving from the possibility of an optimal exploitation of the available width space which is required by the drum supports, as they are now comprised of a bearing at each drum side, at the closest distance possible therefrom and directly mounted to the associate side wall of the wall. With the traditional arrangement of the rotary drum on a shaft perpendicular to the loading door, the shaft was necessarily cantilevered at only on side, i.e. the rear side, by means of two bearings in series, which must be spaced apart by such a length to give a supporting arm long enough to produce vibrations as small as possible. Such an arrangement clearly required more room in the depth direction, with also the addition of the space occupied by the traditional glass door with rubber gaskets. The resulting overall size along the drum axis, corresponding to the machine depth, reached thereby the standard dimension of 57 cm required for the built-in type. Now this dimension, still measured along the drum axis direction, and consequently in width according to the invention, may be reduced to 40-45 cm thanks to the different type of supports used, as explained above, and owing to the fact that the loading door, preferably being a less cumbersome door, is located at a side parallel to said axis, therefore such as not to require room along the direction thereof, i.e. the width direction. The required 57 cm in the depth direction are instead obtained without problems from the width size of the traditional washing-machines, which was just of this size order, up to 60 cm, especially when using a front side loading door with reduced overall size according to the preferred embodiment of the invention.

A further consequence of the above-mentioned arrangement of the support bearings of the rotating drum is the advantage that the gap between the latter and the washing tank may be of a reduced size radially with respect to the known machines, due to the lower capability of bending of the drum shaft, thus requiring a less quantity of water for washing, with consequent reduced consumption of detergent and electric power.

These and further objects, advantages and characteristics of the washing-machine according to the invention will be clear to those skilled in the art from the following detailed description, in two constructional variations, of the said machine with reference to the annexed drawings in which:

FIGURE 1 is a front view, with front side wall partially removed, of a washing-machine according to the invention;

FIGURE 2 shows a partial cross-section view taken along line II-II of Fig. 1, and FIGURE 2a a sectional view, complementary to Fig. 2, relating to a washing-machine of the invention, to be loaded from the top; and

FIGURE 3 shows a diagrammatic, partly in cross-section view of the machine according to the invention, with outer casing completely removed, taken along the direction of arrow A of Fig. 2.

With reference to the drawings, the washing-machine of the invention comprises within a mantle or casing 1 the known components of this type of machine, i.e. a washing tank 2 containing therein a rotary perforated drum 3, having the usual size for standard load capacity of at least 5 Kg of dry laundry. It is rotatably mounted about an axis X-X, being fixed to a pulley 4 which is co-axial with the drum 3 and the tank 2 and driven in turn by a motor 6 through a belt 5. The washing tank is supported in a known manner by damping feet 7 and thereunder a discharge conduit 8 leads to a filter 9 through a discharge pump 9a. According to the invention, the filter is preferably directed upward slantwise, so as to open to the outside, where a filter cover 11 is provided over a base board 10, which in the model to be embedded can be adjusted in the depth direction to prevent any interference therewith. From pump 9a, in the direction opposite to filter 9, a discharge hose 11a conveys to the outside the water used for washing.

Of course casing 1 is mounted on a supporting base 15 with adjustable feet 16 resting on the floor and a control panel 12 is also provided with the various knobs and lights of control and signalling, in particular the programmer knob 13, possibly of the "push-pull" type, being the subject of a prior patent of the same applicant. At one side of said panel, in a known position, there is also provided a door 14 for the detergent-container drawer.

The washing-machine according to the invention has the rotation axis X-X of drum 3 directed along the width direction of the machine itself, thereby parallel to the front wall 17 thereof. With reference to Fig. 3 there is shown more clearly how the drum 3 is rotatably mounted about axis X-X, namely on bearings 20, 20′ on either side of the drum which preferably has at its axial zone a recess 29, 29′ on each side in order to further reduce the width overall size. The case of bearing 20 has been sectioned in Fig. 3 to show the connection with the driving pulley 4 through out the thank 2 wall.

With such an arrangement the rotary drum 3 is formed with an inlet door 21 on its cylindrical lateral surface, e.g. comprised, as shown, of two wings 21a, 21b which are hinged at one end and can be closed by a hook means 22. In Fig. 2 the door 21 has been represented closed and, with broken lines, open in a position facing a front loading door 19. The latter is preferably made, as shown in the drawings, hinged at its lower end to the front wall 17 and provided with a stop means so as to take, when open, the horizontal position shown by broken lines in Fig. 2, which allows the utilization of a handy support plane for the laundry to be loaded into the washing-machine or when taking off the washed clothes therefrom. The door 19 has also the least overall size possible in the depth direction, in order to reduce as much as possible the room required without obviously any interference with the washing tank 2. The latter shows an opening of its lateral cylindrical surface, corresponding to the aperture defined by door 19 in the front wall 17.

As on the other hand, according to one of the features of the present invention, by utilization of the same basic components with only simple modifications of the moulds this machine is adapted to be manufactured in various models, e.g. as a top-loading type, in this case the loading door 18 will be provided on the top 23 of the machine and correspondingly the washing tank 2 will have the above-mentioned opening in its upper portion instead of the front central zone as in case of front side loading. In Fig. 2a a portion of machine has been represented as a top loading model, and in this case it will necessarily be of the "free-standing" type, even possibly recessed between adjacent pieces of forniture, but certainly not to be integrally built-in.

On the contrary, when in case of front loading models, the machine of the invention is readily adaptable, with the appropriate equipments, in kitchen- or bath furnishing systems provided with continuously extending top and baseboard. In fact it will be sufficient to provide, on the front wall 17, pairs of hinges 25 on either side of the said wall (according to whether hinging on the right or left hand side is desired) for a wing 24 (see Fig. 2) to be applied frontally for a correct alignment with the adjacent forniture. If the wing also covers the control panel 12, leaving clear the programmer knob 13 in case this is of the push-pull type, as already stated above it is however convenient that in association with these controls signalling lights 26 are provided, of the LED type, to indicate the operating conditions to the outside, even with closed wing. An upper shelf 27 with a front board being adjustable as to the height ensures the continuity of the "top" with the possibility of reaching the standard height of 85 cm for the built-in model.

Finally, with reference to the adjustable baseboard 10, the particular arrangement of filter 9 has been already mentioned, such as to prevent any interference therewith, and an adjustable baseboard-holder guide 28 will also be provided.

From the foregoing it will be clear which are the advantages of less space occupied and more possibilities of fitting into a forniture system having continuity features, that are afforded by the washing-machine of the invention. A 45 cm width actually corresponds to three elementary modules of fitting and clearly provides much more possibilities of

embedding in the forniture of kitchens or bathrooms, even when these rooms are of reduced size, than with a washing-machine having a width of about 60 cm-width, like the known machines on sale. It should be appreciated that all this is obtained without any limitation of the machine characteristics, as to either the washing quality, or the load capacity, but on the contrary with some saving of the water utilized and consequently of the relevant consumption of detergent and electric power. Another important advantage is that of being able to manufacture only one basic model, adaptable at will by simple modifications to moulds or fittings during the final setting up, to become a top- or front-loading type machine, "free-standing" or to be recessed.

It will be appreciated that the above-mentioned dimensions should not be considered as limiting, but only as examples of the size reduction possibilities according to the invention, the actual dimensions being adaptable in a known manner to a possible different size or special requirements of use.

**Claims**

1. A washing-machine with reduced width size, comprising a cylindrical washing tank (2) and a rotary drum (3) mounted for rotating co-axially therein being moved by a driving motor (6) through a pulley (4) which is co-axial with the said drum, characterized by the fact that the rotation axis (X-X) of the drum (3) extending itself between two end bearings (20, 20') mounted to the side walls of the tank (2), is parallel to the front vertical wall (17) of the machine, an inlet door (18, 19) to the inside of the machine being provided on said wall (17) or on the top (23) for a possible loading from above, there being also provided an associate opening, formed at the peripheral skirt of tank (2), as well as an opening suitable to be closed at the periphery of the rotary drum (3) by means of an inlet door (21).

2. A machine according to claim 1, characterized by the fact that said front vertical wall (17) has a width size which is less than either side wall being directed along the machine depth, with an overall width of 40-45 cm, opposed to a standard overall depth of about 57 cm.

3. A machine according to claim 1 or 2, characterized by the fact of having at said front wall (17) a loading door (19) corresponding to said associate opening of the tank (2) and hinged along its lower side, there being provided a retainer means to stop said door (19) when open at a horizontal position.

4. A machine according to claim 1 or 2, characterized by the fact that said opening formed at the peripheral skirt of the tank (2) is provided on the upper portion thereof, and in direct communication with said opening a loading door (18) from above is provided at the machine top (23).

5. A machine according to claim 4, suitable to be used as a "free-standing" model.

6. A machine according to claim 1, further comprising a discharge pump-filter assembly in which a filter (9) extends itself from a pump (9a), to a sloping upward direction until reaching the front wall (17) at a higher position than a lower band, without any interference with the latter which is adapted to comprise a baseboard (10) being adjustable by means of guides (28) in the depth direction.

7. A machine according to claim 1, comprising hinges (25) for mounting a wing (24) at an edge, either on the right or on the left hand-side of the front wall (17).

8. A machine according to claim 7, wherein said wing (24) is arranged to cover the whole front portion of the machine, including a control panel (12) provided at a known position on an upper front portion of the machine, with a door (14) of the detergent-container drawer, and comprises, in association with each of one or more controls or signals provided on said control panel (12) a LED signalling light (26).

9. A machine according to claim 1, characterized by the fact that said door (21) for closing the rotary drum (3) comprises two wings (21a, 21b) hinged and suitable to be closed by a hook means (22).

Fig.1

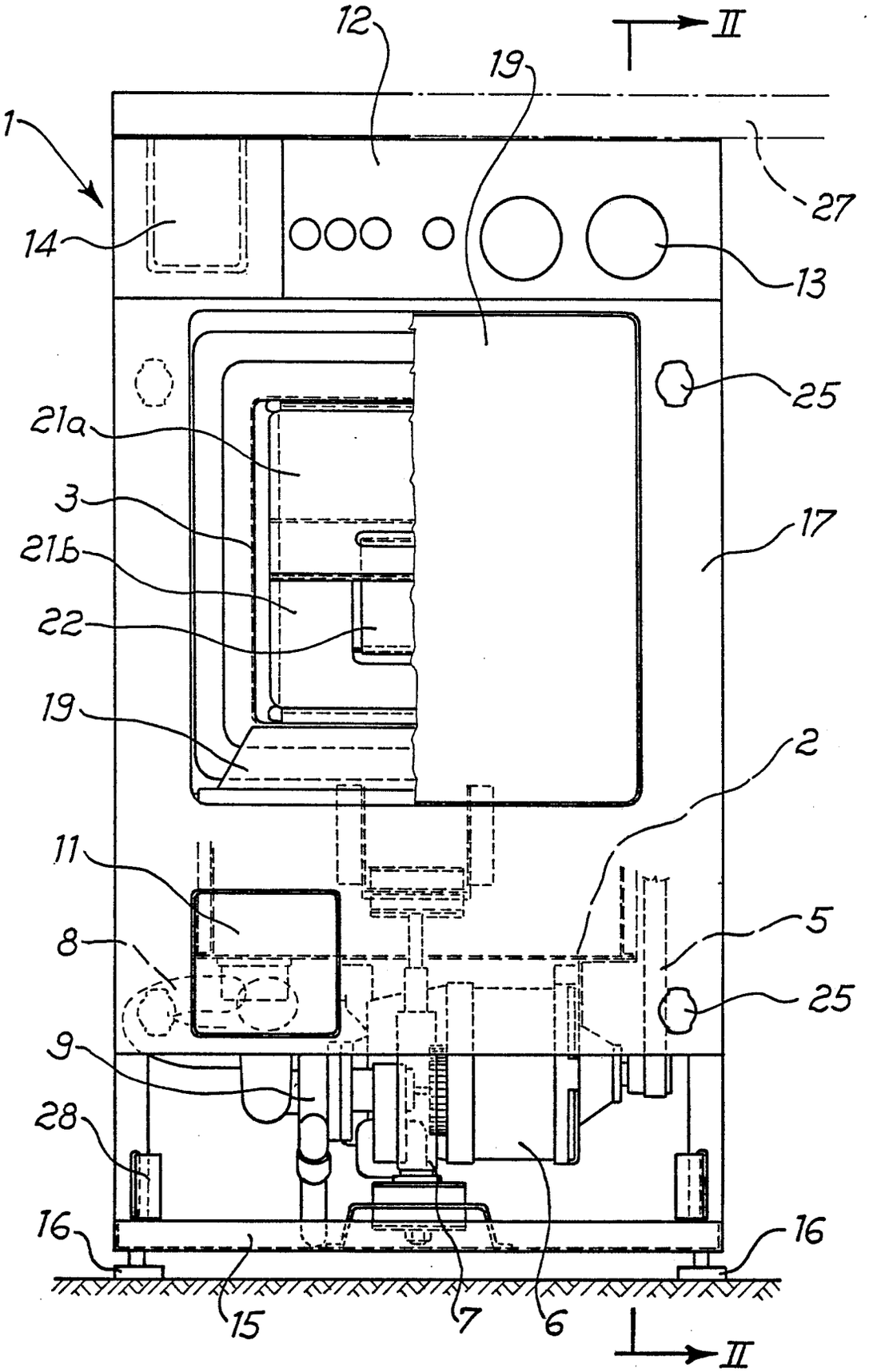


Fig. 2

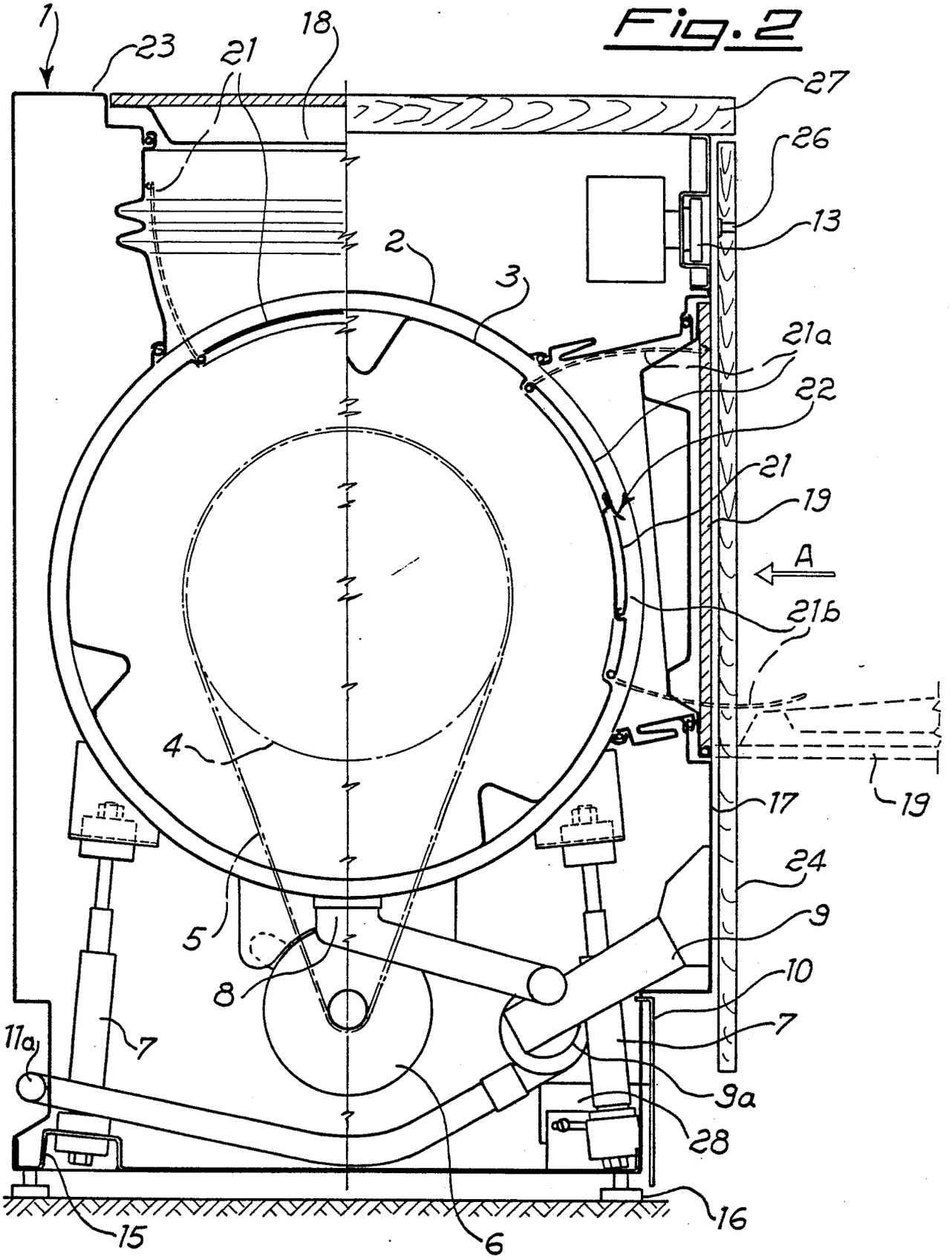

1
23
21
18
27
26
13
2
3
21a
22
21
19
A
21b
19
17
24
9
10
7
9a
28
16
6
4
5
8
7
11a
15

Fig. 2a

Fig.3